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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/603,050	06/24/2003	Jung Ho Ma	CU-3269 RJS	1886

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EXAMINER

SCHECHTER, ANDREW M

ART UNIT	PAPER NUMBER
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2871

DATE MAILED: 09/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/603,050	Applicant(s) MA ET AL.	
	Examiner Andrew Schechter	Art Unit 2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2003.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-3 and 5-8 is/are rejected.
7) ☒ Claim(s) 4 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 24 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Vertical alignment mode liquid crystal display device having pixel electrode on protrusion on resin layer".

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Sasaki et al.*, U.S. Patent Application Publication 2003/0043336 in view of *Jang et al.*, U.S. Patent No. 6,342,935, and further in view of *Kim et al.*, U.S. Patent No. 6,567,144.

Sasaki discloses [see Figs. 4 and 16, for instance] a vertical alignment mode LCD which comprises upper and lower substrates [20, 30], a liquid crystal layer [24] having negative dielectric anisotropy [paragraph 0128, for instance], a layer [22 and 44] applied on the inner surface of the lower substrate so as to cover a thin film transistor, the layer having a centipede-shaped [see Fig. 4a] protrusion [44] formed on the surface

thereof, a pixel electrode [46] which is formed on the protrusion while being disposed all over a pixel region, a counter electrode [26] formed on the inner surface of the upper substrate; and vertical alignment films [32, 34] interposed between the pixel electrode and the liquid crystal layer and between the counter electrode and the liquid crystal layer, respectively.

Sasaki does not disclose that the layer covering the TFT and having the protrusion is made of resin. *Jang* discloses [see Fig. 3C, etc.] an analogous insulating film [122] covering a thin film transistor [120] and having a pixel electrode [126] on it, and having a protrusion [122c] formed on its surface, and discloses that it is made of resin [col. 3, line 62 – organic, hence resin]. It would have been obvious to one of ordinary skill in the art at the time of the invention to make the layer with centipede-shaped protrusion [22 and 44] in *Sasaki* as a single layer made of a photosensitive resin as disclosed in *Jang*, motivated by *Jang's* teaching that producing the structure by photolithography on a resin in this manner reduces the number of layers deposited while only increasing the number of exposures, thereby simplifying the overall process [see abstract].

Sasaki also does not disclose [in this embodiment] having crossed polarizers attached on the outer surfaces of the substrates. *Kim* does disclose [see Fig. 7] such crossed polarizers [16 and 26] for an analogous vertically aligned, multi-domain device. It would have been obvious to one of ordinary skill in the art at the time of the invention to use such crossed polarizers, motivated by need to control the polarization of the light

passing through the device in order to obtain the desired image. Claim 1 is therefore unpatentable.

Sasaki's dimensions [paragraph 0177, for instance] give the protrusion (and hence the central portion) a width of 3 or 4 μm , which is less than 5 μm , and the outer portions are arranged at both sides of the central portion at intervals of 6 μm , which is in the range of 4-25 μm , so claim 2 is also unpatentable.

Sasaki does not disclose phase compensation plates as recited, but *Kim* does disclose them [41, 42], and it would have been obvious to one of ordinary skill in the art at the time of the invention to use them, motivated by the desire to improve the display quality and viewing angle as such compensators are designed to do. Claim 5 is therefore unpatentable as well.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Sasaki*, *Jang*, and *Kim* as applied to claim 1 above, and further in view of *Shimada et al.*, U.S. Patent No. 6,147,722 and *Yasukawa*, U.S. Patent No. 6,344,888.

Sasaki does not disclose the interval between adjacent pixels; they are formed on a layer above the bus lines, so there is no theoretical impediment to them being closer than 10 μm to each other. *Shimada* discloses analogous pixel electrodes which are "typically 5 μm " apart [col. 16, lines 24-27] and *Yasukawa* discloses analogous pixel electrodes which are "in close proximity to the adjacent pixel electrode... for example, 1 μm , so as to decrease the light leaked between the pixel electrodes as much as possible" [col. 10, lines 40-44]. It would therefore have been obvious to one of ordinary

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skill in the art at the time of the invention to make the interval less than 10 μm , motivated by the above teaching of *Yasukawa*. Claim 3 is therefore unpatentable.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Sasaki*, *Jang*, and *Kim* as applied to claim 5 above, and further in view of *Terashita et al.*, U.S. Patent No. 6,512,561.

Kim discloses using monoaxial or biaxial phase compensation plates [col. 7, lines 2-13], but is silent on the phase delay value in either case. *Terashita* discloses [col. 12, lines 20-52] using two monoaxial (uniaxial) phase compensation plates in an analogous LCD and having the phase delay value set to 175 nm, within the recited range. It would have been obvious to one of ordinary skill in the art at the time of the invention to do so in the above device, motivated by *Terashita's* teaching that optimizing the phase delay value in this way reduces light leakage in an inclined direction and produces a better display. Claim 6 is therefore unpatentable.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Sasaki*, *Jang*, and *Kim* as applied to claim 1 above, and further in view of *Arakawa et al.*, U.S. Patent No. 6,621,550.

Sasaki discloses a negative dielectric anisotropy, but is silent on its absolute value. *Arakawa* discloses, for an analogous vertically aligned LCD, having the dielectric anisotropy range from -2 to -10 . It would have been obvious to one of ordinary skill in the art at the time of the invention to do so in the device of *Sasaki*, motivated by *Arakawa's* teaching that if the value is closer to zero than -2 , the threshold voltage required to drive the device increases undesirably, and that there are no practical liquid

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crystals having a value greater than -10 [col.2, lines 27-59]. Claim 7 is therefore unpatentable.

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Sasaki*, *Jang*, and *Kim* as applied to claim 1 above, and further in view of *Yamada et al.*, U.S. Patent No. 6,466,296.

Sasaki is silent on the liquid crystal thickness for the given embodiment (though it gives values in the recited range for other embodiments), and silent on the refractive index anisotropy as well. *Yamada* discloses, for an analogous vertically aligned LCD, having the liquid crystal thickness about $6\text{ }\mu\text{m}$ and the refractive index anisotropy 0.08, so that the product is 480 nm, within the range recited. It would have been obvious to one of ordinary skill in the art at the time of the invention to use these values in the device of *Sasaki*, motivated by *Yamada*'s teaching that doing so obtains a retardation giving a satisfactory contrast [col. 8, lines 21-25]. Claim 8 is therefore unpatentable.

Allowable Subject Matter

8. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter:

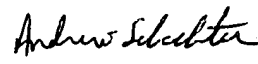
The prior art does not disclose the device of claim 4, in particular the additional limitation that the structure of the protrusion and pixel electrode is formed into a clamp shape within a unit pixel. Claim 4 would therefore be allowable if rewritten appropriately.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Andrew Schechter
Patent Examiner
Technology Center 2800
14 September 2004